6

Seven Mile Creek Mound

Introduction

Archaeological excavations of the Seven Mile Creek Mound revealed a dense cultural deposit dominated by marine shell dated to c.3,950 cal BP. This result provides some of the earliest evidence of focussed marine exploitation from an open archaeological site on the Queensland coast. This chapter describes the site and its stratigraphy, chronology and contents, followed by a discussion of the implications of the data for understanding the archaeology of the study region.

Site description and setting

The Seven Mile Creek Mound is a discrete shell mound located on a low, sandy ridge isolated on tidal flats fringing Seven Mile Creek, approximately 35km southeast of Gladstone (Latitude: 24°04'01"S; Longitude: 151°31'11"E) (Fig. 6.1). Hummock Hill Island and Innes Head shelter the Seven Mile Creek estuary, which is fringed by extensive communities of spotted mangroves (*Rhizophora stylosa*) and to a lesser extent grey mangroves (*Avicennia marina*). Claypans and saltflats fringe most of the foreshore, with a small brackish zone in the upper reaches of the estuary maintained by freshwater inflow from Seven Mile Creek (Olsen 1980a:18). Extensive tidal flats adjacent to the site support dense populations of rock oyster (*Saccostrea glomerata*) and hairy mussel (*Trichomya hirsutus*). The base of the mound is less than 1.5m above mean high tide level. The mound is fringed by a number of mature Moreton Bay ash trees (*Eucalyptus tessellaris*) and its surface is covered by introduced grasses. Vegetation surrounding the mound is open woodland with mature trees including the forest red gum (*E. tereticornis*), burdekin plum (*Pleiogynium timorense*) and quinine tree (*Petalostigma pubescens*). The understorey is generally open, with frequent occurrences of introduced weeds including prickly pear (*Opuntia stricta*) and lantana (*Lantana camara*) (Fig. 6.3). A four wheel drive track runs along the saltflat margin to the north of the site. Grazing in the area is evidenced by the presence of cattle faeces on and around the mound

site. The site measures 20m east-west × 10m north-south × 0.8m high (Fig. 6.2). Estimated volume is 44m^3 based on digital terrain modelling (Fig. 6.2). Scattered low density shell material is visible in disturbed areas away from the mound itself and several stone artefact scatters with rounded quartz nodules and flaked material were found on the tidal flats to the southeast of the mound.

Although shell mounds are a relatively common feature of the coastal archaeological record of northern Australia, these site types are generally restricted in distribution to locations above the Tropic of Capricorn and are almost exclusively late Holocene in age (e.g. Bailey 1999; Beaton 1985; Veitch 1999). The Booral Shell Mound on the western shore of Great Sandy Strait dating to 2,950±60 BP (Beta-32046) is the only mound investigated on the Queensland coast to the south of the study area (Frankland 1990). Godwin and Ulm (2004) have also recently reported a probable shell mound complex at Buxton, just south of Bundaberg. Early reports indicate that other mounds may have existed in southeast Queensland that have been destroyed (Anon. 1877 cited in McNiven 1994a:1). Despite exhaustive surveys, and an otherwise rich Aboriginal archaeological record, only three shell mounds are known for the 500km stretch of shoreline between Hummock Hill Island and Agnes Water (Ulm and Lilley 1999). Shell mounds at Round Hill Creek and Hummock Hill Island have been damaged by development activity, leaving the Seven Mile Creek Mound the only known remaining intact example of this site type in the region.

The site was first described by Neal (1986), then a consultant archaeologist for Telecom Australia, who identified it from a circling helicopter, although Rowland (1987) was unable to locate the site during a field inspection later that year. Local informants suggested to Rowland that it was quartz tailings from quarrying activities. In late 1999 the mound was relocated by the author

Figure 6.1 The Seven Mile Creek catchment area showing the location of the Seven Mile Creek Mound as a triangle. Dark grey shading indicates the general extent of mangrove, saltflats and claypans.

Figure 6.2 Topographic map of the site area, showing the position of the excavation. The site datum is shown as a triangle. Dashed lines indicate the location of the tide strand line during the period of excavation. The wide shaded line denotes a 4WD track on the edge of the saltflats. Contours in 10cm intervals.

during pedestrian transect surveys conducted as part of the Gooreng Gooreng Cultural Heritage Project (Lilley and Ulm 1999) and targetted for excavation. It is registered on the Queensland Environmental Protection Agency's (EPA) Indigenous Sites Database as KE:A09 and Queensland Museum Scientific Collection Number S229. A note on the initial radiocarbon dates and descriptions of the excavation have been presented elsewhere (Ulm 2000b, 2002c).

In addition to the mound, Neal (1986) recorded a sparse shell and stone artefact scatter on the peninsula immediately north of the site (KE:A08). Several sparse shell midden scatters have also been recorded on Hummock Hill Island to the north (Alfredson 1993). A stone arrangement at the summit of Hummock Hill is entered in the EPA database (KE:A04). Alfredson (1993) identified this site 'as a probable surveyor's trig point' although her subsequent research failed to locate records for the establishment of such a point in archival records. A shell mound is the major archaeological feature recorded on the island with a depth of up to 40cm (JE:A65). Burke (1993), however, noted that only a small portion of the deposit had not been damaged by bulldozer activity and water erosion. On the eastern margin of Seven Mile Creek, Burke (1993) located an isolated low density surface shell scatter at Innes Head during surveys between Innes Head and Thornton Creek (KE:A56) (see Fig. 2.9).

Figure 6.3 General view of the Seven Mile Creek Mound. Note the low fringing mangroves on the intertidal flats through the gap in trees at rear left of frame. Facing south.

Figure 6.4 General view of the completed excavation. Note the dark zone of grass root penetration at the top of the deposit. Facing north.

Excavation methods

A single 1m^2 pit divided into four 50cm x 50cm quadrants (Squares A–D) was excavated into the highest part of the mound between 26 January and 16 February 2000 (Fig. 6.2). The excavation grid was located so as to maximise the potential depth of deposit and to avoid the sloping margins of the mound. Excavation proceeded in shallow, arbitrary excavation units (XUs) averaging 3.75cm in depth and 12.75kg in weight. Excavation ceased at a maximum depth of 117cm below ground surface when cultural material ceased to be recovered (Figs 6.4–6.5). A total of 130 XUs was removed, distributed as follows: Square A (31 XUs), Square B (34 XUs), Square C (31 XUs), Square D (34 XUs). A total of 1,631kg of

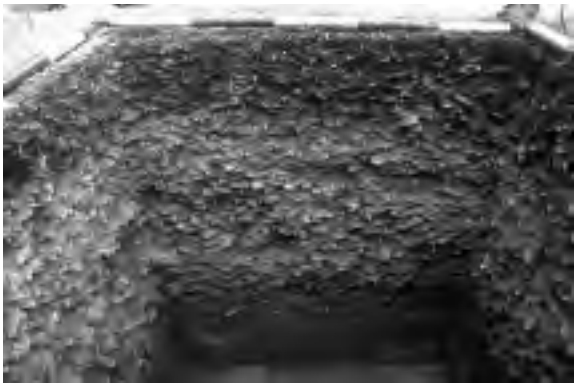

Figure 6.5 General view of completed excavation (Squares D–A). Note the stratigraphic break at the base of the shell deposit. Facing north.

sediment was excavated. Sediments were gently dry-sieved through 3mm screens onto a plastic tarpaulin 20m south of the excavation to prevent contamination of underlying sediments and to minimise the risk of airborne dust for excavation personnel. *Anadara trapezia* (n=158), charcoal (n=74), stone (n=59) and bone (n=3) specimens encountered *in situ* during excavation were plotted three-dimensionally. Articulated *A. trapezia* specimens encountered *in situ* were plotted and removed whole to allow examination of contents under controlled laboratory conditions. The excavation was backfilled with a layer of plastic sample bags across the base, followed by a thick layer of archaeologically sterile white beach sands from the adjacent mangrove fringe and topped with the sediments that had passed through the sieve (see Chapter 3 for a detailed discussion of the standard excavation methods employed at all sites).

Cultural deposit and stratigraphy

Excavation revealed a 85cm thick deposit of dense shell resting on well-rounded beach sands containing occasional pieces of shell and degraded pumice. A veneer of fragmented shell encountered at the top of the deposit may be attributed to a combination of cultural and environmental factors, such as cessation of cultural deposition, trampling, weathering and/or the effects of fire and the recent invasion of exotic grasses, shrubs and cattle (see Robins and Stock 1990). Although occasional cultural material was recovered between 90–100cm below the top of the mound, systematic and continuous use of the site is not evidenced until the base of the shell mound deposit at around 85cm, roughly contiguous with the surrounding natural ground surface. The lowermost excavated deposits between 100–117cm were culturally-sterile, indicating that initiation of midden formation can be dated with confidence. The rate of site accumulation calculated using the methods outlined by Stein et al. (2003) indicate an extremely rapid rate of site formation of 23.3cm/100 years.

The deposit can be divided into four major stratigraphic units (SUs) based on sediment colour and texture (Figs 6.5–6.6, Table 6.1). Few sediments occur at all in SU1–2 which are overwhelmingly dominated by the shell fraction. The dark greyish brown to yellowish brown sediments of the upper shell deposit are assumed to derive from a combination of aeolian transport of sediments trapped by an exposed irregular shell surface and subsequent percolation of sediments down the shell profile. Occasional tree roots and sometimes large non-artefactual rocks were observed throughout the deposit. Acidity (pH) values are highly alkaline and decrease with depth from 10.0 at the surface and throughout the dense shell zone to 8.0 below the shell zone.

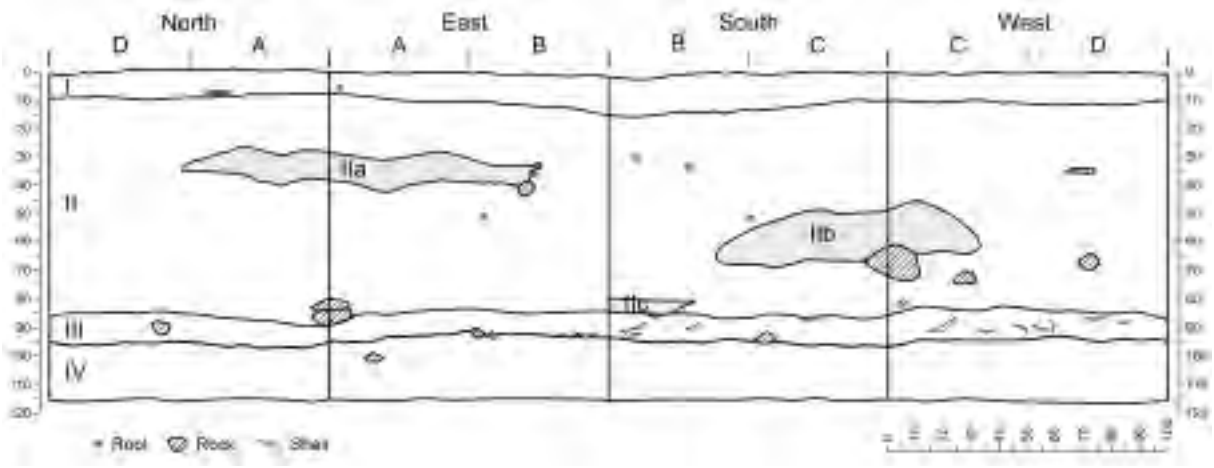

Figure 6.6 Stratigraphic section, Seven Mile Creek Mound, Squares A–D.

Table 6.1 Stratigraphic Unit descriptions, Seven Mile Creek Mound, Squares A–D.

SU	DESCRIPTION
I	Extends across the entire square, with an average depth of 8–9cm and a maximum depth of 13cm below the surface. The unit comprises compact shell with a minor component of fine angular poorly-sorted dark to very dark greyish brown (10YR-3/2) humic sediments. The SU is penetrated by fibrous grass roots, particularly across its upper margin. Cultural materials are dominated by fragmented oyster shell, but also include mud ark, hairy mussel, hercules club whelk, nerite, stone artefacts, charcoal and fish bone. pH values are highly alkaline (9.5–10.0).
II	Extends across the entire square with a maximum thickness of 82cm and a maximum depth of 90cm below the surface. It comprises a compact shell matrix. Sediments are poorly consolidated with colour ranging from dark greyish brown (10YR-4/2) to yellowish brown (10YR-5/4). This unit includes several areas distinctive in either fragmentation (SUIIa), limited taxa representation (SUIIb), or burning (SUIIc). A few tree roots up to 20mm in diameter occur in Squares B and C. Cultural materials consist of whole shells with patches of fragmented shell, dominated by oyster with small quantities of hairy mussel, mud ark, scallop, hercules club whelk, nerites as well as stone artefacts, charcoal and fish bone. Occasional rocks and shells with oyster bases attached are also present. pH values are highly alkaline (9.0–10.0).
IIa	An extremely compact lens of fragmented shell exposed for almost the entire length of the east section (Squares A and B) and the northeast half of Square A. The unit has a maximum thickness of 10cm and maximum depth of 41cm below the surface. Otherwise the unit is the same as SUII. The deposit is dominated by oyster and hairy mussel.
IIb	A compact lens of mud ark valves exposed across the southwest corner of Square C. The unit has a maximum thickness of 18cm and maximum depth of 68cm below the surface. Otherwise the unit is similar to SUII with the presence of many articulated mud ark valves and a noticeable reduction in the representation of other taxa.
IIc	Layer of burnt shell and charcoal fragments exposed only across the southeast corner of Square B towards the base of SUII. The unit has a maximum thickness of 5cm and maximum depth of 83cm below the surface. Otherwise the unit is the same as SUII.
III	Extends across the entire square with a maximum thickness of 11cm and a maximum depth of 98cm below the surface. The unit comprises poorly consolidated fine subrounded poorly-sorted brown (10YR-4/3) sands underlying the dense shell deposit. SUIII is differentiated from SUII by the dominance of sandy sediments rather than shell in the matrix. Cultural material includes occasional shell, rocks, charcoal and small pieces of pumice. The pH values are alkaline (8.0–8.5), decreasing with depth.
IV	Extends across the entire square, with a maximum thickness of at least 24cm and maximum depth of at least 117cm below the surface. The base of this unit was not reached. It comprises medium rounded well-sorted poorly consolidated light olive brown (2.5Y-5/4) sands with extensive mottling of yellow sands. This SU is culturally-sterile with occasional degrading rocks and pumice. The pH values are alkaline (8.0–8.5), decreasing with depth.

Radiocarbon dating and chronology

Eight radiocarbon determinations were obtained for the deposit from Square A (Table 6.2). Four conventional radiocarbon dates were obtained on articulated *A. trapezia* valves which were plotted *in situ* during excavation. These shell samples were paired with associated single fragments of blocky charcoal which were dated by accelerator mass spectrometry (AMS) to investigate local marine reservoir conditions (see Chapter 4). Single pieces of charcoal were selected to avoid combining fragments representing possibly separate events (e.g. Ashmore 1999). Calibration calculations employed a ΔR correction value of –155±55 (see Chapter 4). On the basis of the x-ray diffraction analysis, three shell samples (Wk-8325, Wk-8347 and Wk-8455) derived from SUII 13–20cm below ground surface were rejected as they contained recrystallised material. The charcoal date NZA-12272 is clearly at odds with the other seven age determinations available and indicates a lack of association with the paired shell sample (Wk-8324) from the same depth. This small charcoal sample (<0.1g) is derived from SUI close to the top of the deposit (7–10cm) and may have been introduced through percolation into the midden profile. It is therefore rejected from further consideration. The lower two shell dates (Wk-8327 and Wk-8328) appear inverted, but in fact overlap within one standard deviation. Although occasional cultural material was recovered up to 10cm below the lowest dated sample much of this material was probably pushed into the loosely consolidated sandy sediments from the base of the mound, suggesting that the determination of NZA-12118 dates the initiation of deposition at this part of the site. Given the homogeneity of SUI, Wk-8324 from the base of SUI provides a determination that may be relied upon for dating the termination of occupation. The ^{14}C and AMS determinations display a firm stratigraphically sound sequence overall, suggesting extremely rapid accumulation over a period

of about 350 years with initial occupation around 3,947 cal BP and abandonment shortly after 3,608 cal BP. A standard chi-square test to determine statistically significant differences in the determinations (Ward and Wilson 1978) indicates that all four conventional shell determinations are indistinguishable at the 95% confidence level.

Table 6.2 Radiocarbon dates from the Seven Mile Creek Mound, Square A (see Appendix 1 for full radiometric data for each determination).

SQUARE	XU	DEPTH (cm)	LAB. NO.	SAMPLE	$\delta^{13}C$ (‰)	^{14}C AGE	CALIBRATED AGE/S
A	4	6.8–10.4	NZA-12272	charcoal	−26.0±0.2	1260±80	1293(1171)955
A	4	7.1	Wk-8324	*A. trapezia*	−0.9±0.2	3540±80	3850(3608)3372
A	13	39–43.6	NZA-12117	charcoal	−25.7±0.2	3500±60	3886(3693)3569
A	13	40.4	Wk-8326	*A. trapezia*	−0.8±0.2	3610±70	3919(3684)3462
A	20	67.8–71.5	NZA-12273	charcoal	−23.4±0.2	3570±60	3979(3829,3786,3780)3639
A	20	67.8	Wk-8327	*A. trapezia*	−1.2±0.2	3780±60	4140(3904)3688
A	26	88.7–92.2	NZA-12118	charcoal	−27.8±0.2	3660±60	4137(3957,3952,3924,3921,3910)3725
A	26	88.2	Wk-8328	*A. trapezia*	−0.5±0.2	3750±60	4089(3867)3652

Stratigraphic integrity and disturbance

Several lines of evidence suggest that the deposit exhibits a high degree of stratigraphic integrity. The structural properties of the matrix itself, dominated by closely interlocking whole shells, would prevent significant post-depositional movement of all but very small objects. The three subunits identified as SUIIa, IIb and IIc are linear and roughly parallel to the major stratigraphic units, indicating that they were probably formed on a relatively flat surface (Fig. 6.6). The clear stratigraphic disjunction at the base of the deposit unambiguously demarcates the base of the cultural deposit. No other obvious signs of disturbance, such as burrows, voids, major roots, root casts or similar stratigraphic features, were encountered during excavation. The radiocarbon sequence shows a regular age-depth relationship (with the exception of NZA-12272, see above).

An unusual feature of the deposit is the high incidence of articulated bivalves. Attenbrow (1992:16) noted that articulated shells rarely occur in shell middens, yet 22 articulated *A. trapezia* were encountered in Square A and 158 in the $1m^2$ excavation as a whole. Articulated specimens of the fragile mussel *T. hirsutus* were also recorded during excavation. As noted earlier, articulated specimens are frequently viewed as evidence for the natural origin of sediments in both archaeological (e.g. Claassen 1998:74; O'Connor and Sullvan 1994a; Sullivan and O'Connor 1993) and geomorphological (e.g. Dodd and Stanton 1981:304) studies. The rationale for this assumption is unclear, but probably derives from palaeoenvironmental research in which articulated bivalves preserved in growth position have been used extensively for sea-level and other palaeo-environmental reconstructions. For cultural deposits, however, there is no reason to expect that articulated bivalves will not be present in archaeological shell deposits (Attenbrow 1992).

Ethnographic data from the Anbarra of the Northern Territory indicate that *A. granosa*, a taxon closely related to *A. trapezia*, was prepared by either steaming, being placed directly in hot ashes or having a fire placed on top (Meehan 1982; Robins et al. 1998). It was noted in the previous chapter that such low intensity heating is unlikely to break the ligaments that hold the valves together at the hinge. In the absence of significant mechanical action on the valves after deposition, at least some intact articulated valves are likely to be preserved. The potential for articulated valve preservation is significantly enhanced when high rates of cultural and/or natural sedimentation rapidly emplace a matrix around the articulated valves to minimise further movement. Based on the evidence from the Seven Mile Creek Mound, the presence or absence of articulated bivalves should not be viewed as definitive in distinguishing cultural shell deposits from natural shell

deposits. In fact the presence of some articulated specimens resulting from food refuse suggests that shells were deposited soon after consumption (i.e. fresh) before ligament deterioration rather than by secondary disposal. The large number of articulated *A. trapezia* encountered and their distribution throughout the deposit suggests little post-depositional movement in this part of the site.

Conjoin analysis of the *A. trapezia* valve assemblage reinforces the argument for high stratigraphic integrity of the deposits. A minimum number of conjoins of 61 was identified. Most pairs (55.74%) were separated by less than 5cm and over 80% were separated by less than 10cm. Only 3.28% were separated by more than 15cm (Fig. 6.7). The deposit exhibits a high degree of stratigraphic integrity, given that the maximum separation measurements of conjoins overestimate the actual separation distance between valves in many instances (see Chapter 5). The relatively small distance separating valve-pairs supports the radiocarbon chronology indicating that shell material accumulated during episode(s) of extremely rapid deposition (see Chapter 5 for detailed results of the conjoin analysis conducted on the assemblage).

A. trapezia valves are generally in good condition with low rates of fragmentation, fracturing or cracking suggesting that they were not exposed to extensive post-depositional mechanical damage. *A. trapezia* fragmentation rates are relatively low throughout the sequence (compare, for example, with the Mort Creek Site Complex, see Chapter 7) with an average of 24.5 NISP/100g with peaks of 60.6 and 51.4 at the base and top of the deposit respectively. Zones of low fragmentation are often associated with areas with high numbers of conjoining *A. trapezia* valves.

Laboratory methods

Owing to the large quantity of excavated materials, detailed analysis to date has focussed on a single square (Square A). Field observations and preliminary processing of the other three squares indicate broad consistency in the contents of the excavated material. Results of the analysis of Square A are presented below (see Chapter 3 for a detailed discussion of the standard laboratory methods employed at all sites). Further summary results are available in Appendix 4.

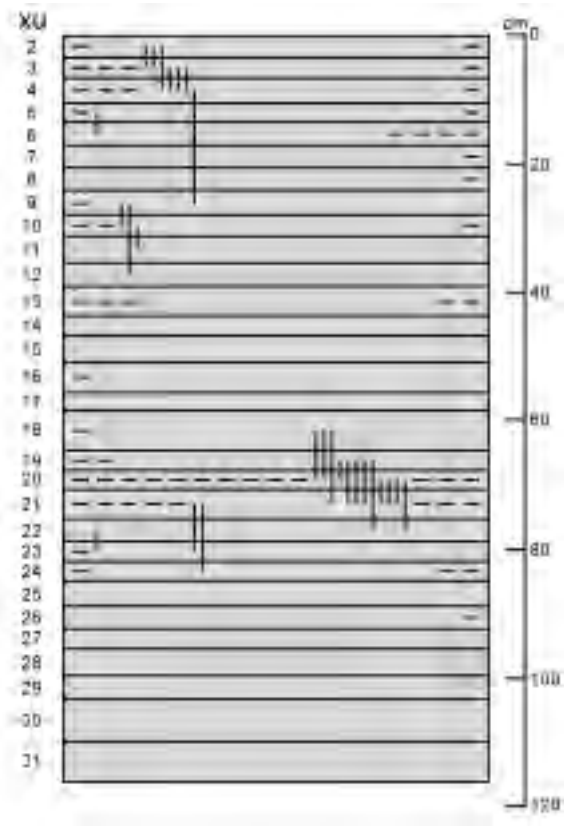

Figure 6.7 Distribution of identified *A. trapezia* valve-pairs (n=61), Seven Mile Creek Mound, Square A. An additional 22 valve-pairs encountered as articulated specimens during excavation are shown as short horizontal lines down the right hand side of the figure. Line termination points indicate the vertical mid-points of the excavation units from which conjoining valves were recovered. Short horizontal lines indicate valve-pairs identified within excavation units. Not to scale on the horizontal axis. See Chapter 5 for details of methods.

Cultural materials

Invertebrate remains

Fifty taxa of shellfish weighing 135,794.8g were identified, consisting of 24 marine gastropods, 20 marine bivalves, five terrestrial gastropods and one freshwater bivalve (Table 6.3). Forty-four taxa are relatively rare, each contributing less than 0.2% of the shell assemblage by weight. The shell deposit is dominated by rock oyster (*S. glomerata*), comprising 78.7% by weight (Fig. 6.8), followed by hairy mussel (*T. hirsutus*) (8.8%) (Fig. 6.9), mud ark (*A. trapezia*) (8.5%) (Fig. 6.10), scallop (*Pinctada albina sugillata*) (1.4%) (Fig. 6.11), hercules club whelk (*Pyrazus ebeninus*) (1.1%) and nerite (*Nerita balteata*, syn. *Nerita lineata*) (1.1%). The assemblage exhibits relatively high diversity

with a calculated Shannon-Weaver Function (H') of 1.596 and Simpson's Index of Diversity (1–D) of 0.587. The relative proportions of the four main taxa remain relatively stable throughout the deposit except for an increase in the relative abundance of hairy mussel in XU4–5 and mud ark in XU2–3 and 19–21 (Fig. 6.16). Crustaceans are represented throughout the cultural assemblage, consisting of mud crab (*Scylla serrata*) weighing a total of 404.5g and barnacle (*Balanus variegatus*) weighing 130.7g.

The bulk of the non-artefactual stone material (20,916.4g; Fig. 6.15) is thought to have entered the site attached to rock platform species such as oysters, as is evidenced in the large number of oysters found still attached to rocks and other shells such as *P. ebininus* and *Velacumantus australis* in the deposit (5,158.5g). Most of the marine gastropods in the assemblage are less than 15mm in height with many less than 5mm, such as *Zafra avicennia*, *Epitonium* sp., *Bembicium nanum*, *Littoraria* sp., *Mitra* sp., *Pseudoliotia* sp., *Metaxia* sp. and *Herpetopoma atrata*. Similarly, many of the marine bivalves are less than 10mm in length, such as *Venericardia* sp., *Corbula crassa*, *Acropsis deliciosa*, *Arcopsis symmetrica*, *Tellina* sp. and *Trapezium sublaevigatum*. Many of the smaller taxa present, particularly many of the gastropods, probably entered the deposit attached to larger shellfish taxa. Even if these small taxa may have been intentionally collected (see Rowland 1994), they clearly did not make a major contribution to the overall diet. These small shellfish, however, reveal potentially important data about environmental zones exploited and foraging strategies.

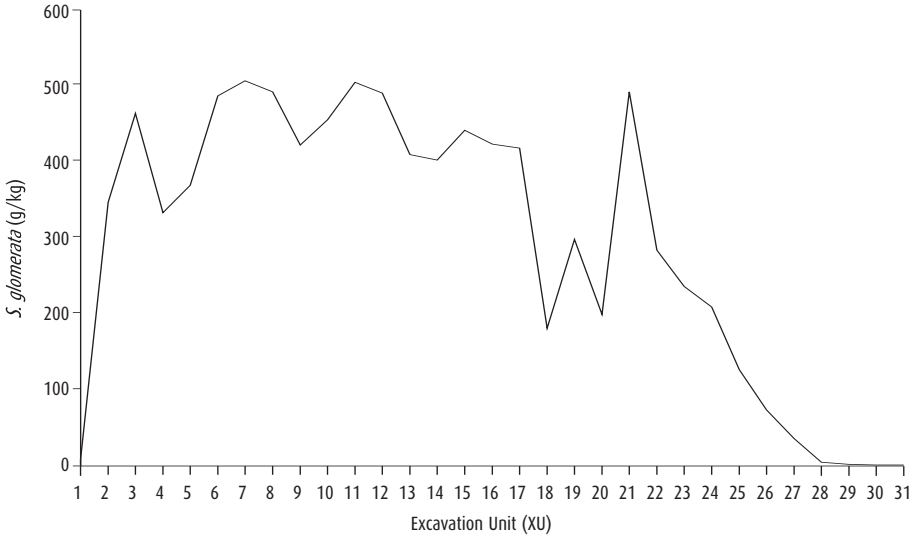

Figure 6.8 Abundance of oyster (*S. glomerata*).

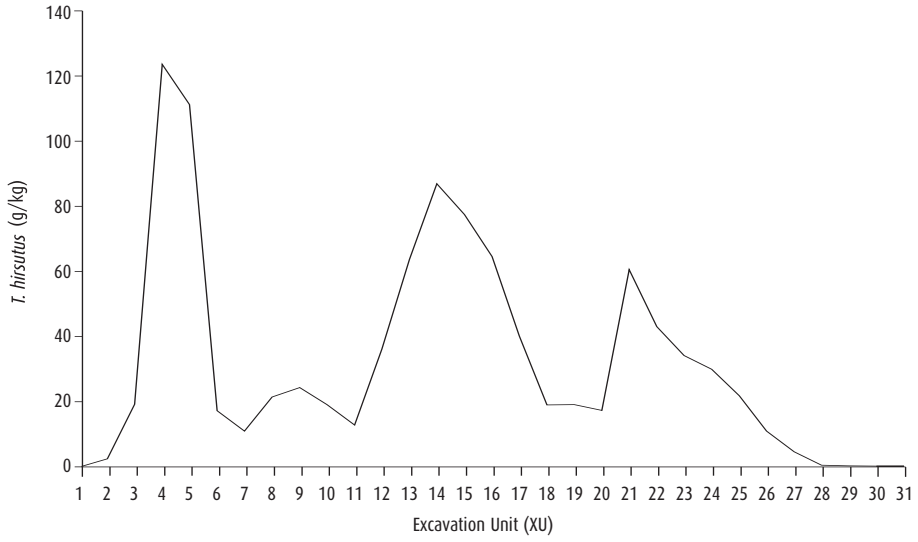

Figure 6.9 Abundance of hairy mussel (*T. hirsutus*).

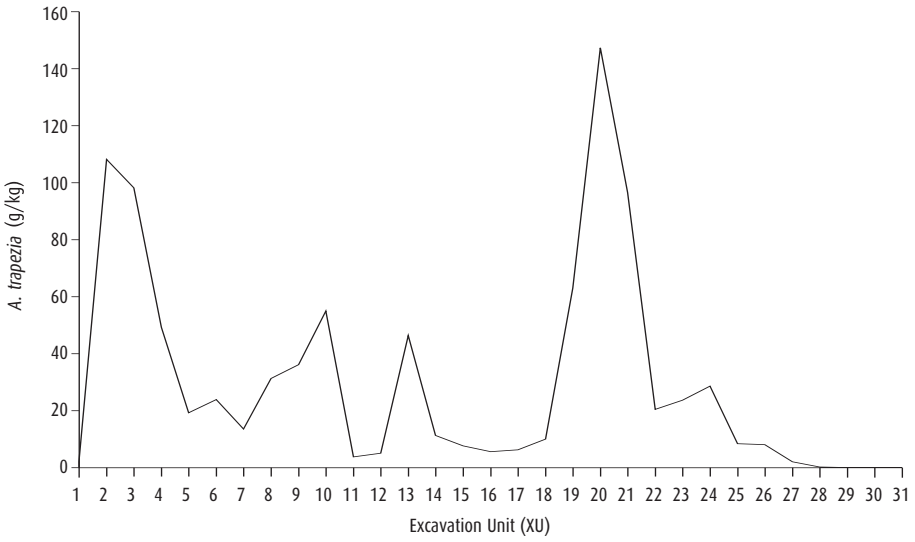

Figure 6.10 Abundance of mud ark (*A. trapezia*).

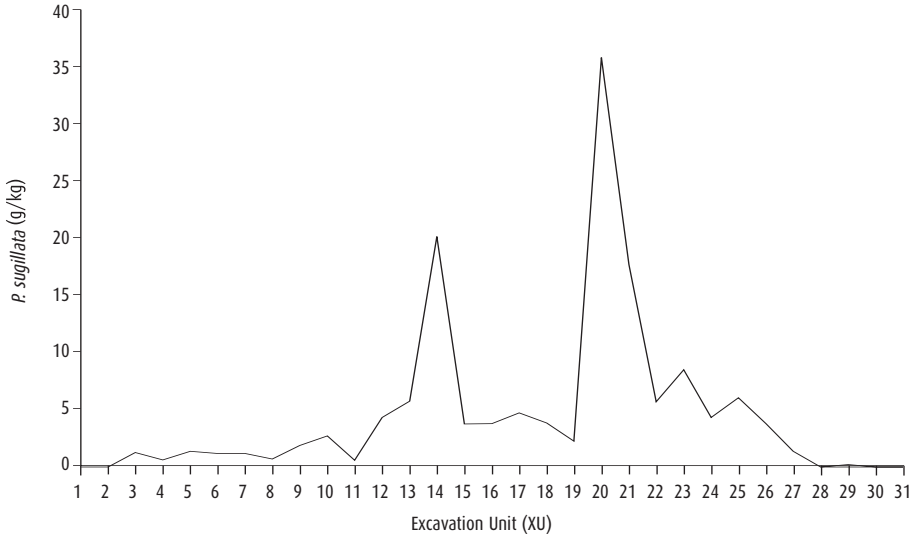

Figure 6.11 Abundance of scallop (*P. sugillata*).

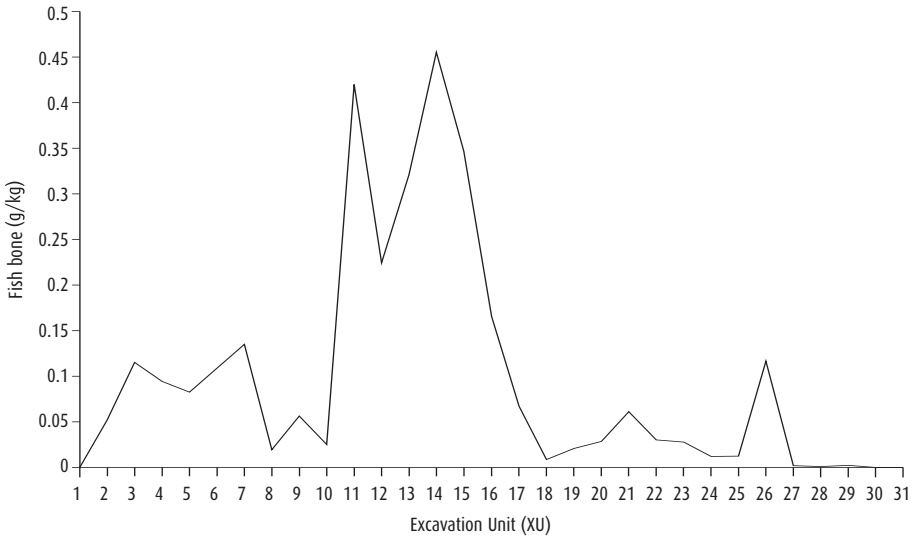

Figure 6.12 Abundance of fish bone.

Table 6.3 Presence/absence of shellfish identified in the Seven Mile Creek Mound, Square A.

FAMILY	TAXON	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	TOTAL (g)
MARINE BIVALVIA																																	
Anomiidae	*Anomia trigonopsis*				X																												5.9000
Arcidae	*Anadara trapezia*	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				11489.1296
Cardiidae	*Acrosterigma vertebratum*				X							X																					20.8000
Carditidae	*Venericardia* sp.			X	X																			X	X								0.1759
Chamidae	*Chama fibula*				X	X	X						X		X	X	X		X	X				X	X		X						141.4335
Corbulidae	*Corbula crassa*									X		X		X	X		X	X				X	X										4.8640
Mytilidae	*Trichomya hirsutus*		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	11899.4321
Noetiidae	*Acrcopsis deliciosa*													X	X																		0.2351
Noetiidae	*Arcopsis symmetrica*															X				X		X	X							X			0.6131
Ostreidae	*Saccostrea glomerata*	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	106833.4143
Pteriidae	*Pinctada albina sugillata*			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X			1882.9224
Tellinidae	*Tellina* sp.																						X										0.0999
Trapeziidae	*Trapezium sublaevigatum*										X	X	X	X	X			X	X		X	X		X	X	X							2.7089
Ungulinidae	*Felaniella subglobosa*														X																		0.0321
Veneridae	*Antigona chemnitzii*																					X											0.3196
Veneridae	*Dosinia tumida*														X																		1.8271
Veneridae	*Gafrarium australe*			X	X	X	X		X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X				20.4363
Veneridae	*Irus* sp.			X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X						26.6503
Veneridae	*Placamen* sp.								X	X		X					X						X										1.7165
Veneridae	*Venerid* sp.					X																	X	X	X								2.7148
MARINE GASTROPODA																																	
Batillariidae	*Pyrazus ebininus*		X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X						1487.8767
Batillariidae	*Velacumantus australis*		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				167.5934
Cerithiidae	*Cerithiid* sp.				X		X									X							X										2.9232
Cerithiidae	*Cerithium* sp.		X		X	X		X		X				X				X	X	X	X	X	X	X		X	X	X					4.0566
Cerithiidae	*Clypeomorus bifasciata*		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X						35.0240
Columbellidae	*Zafra avicennia*			X	X	X	X	X			X	X	X	X		X	X					X	X	X	X	X		X	X					0.5156
Costellariidae	*Vexillum* sp.		X	X																						X	X	X						3.6403
Epitoniidae	*Epitonium* sp.																							X			X	X						0.0281
Fasciolariidae	*Latirus* sp.		X	X					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X						13.5168
Fissurellidae	*Diodora ticaonica*								X				X				X																	0.5322

continued over

Table 6.3 continued

FAMILY	TAXON	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	TOTAL (g)
MARINE GASTROPODA continued																																	
Lottiidae	*Acmaeid* sp.					X	X	X			X	X		X	X	X		X	X		X	X	X									0.5253
Littorinidae	*Bembicium nanum*		X	X	X	X	X	X					X	X	X	X	X		X	X	X	X				X	X						23.5524
Littorinidae	*Littoraria* sp.				X	X	X					X				X	X	X				X	X		X								3.3904
Mitridae	*Mitra* sp.					X																											0.0037
Muricidae	*Bedeva paivae*		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X					77.2569
Muricidae	*Morula marginalba*					X															X	X											15.1567
Nassariidae	*Nassarious burchardi*															X							X	X			X						0.5650
Neritidae	*Nerita balteata*		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		1467.6258
Neritidae	*Nerita squamulata*											X	X				X			X	X	X		X	X		X						2.2910
Planaxidae	*Planaxis sulcatus*			X	X								X	X	X		X			X	X	X											4.8336
Skeneidae	*Pseudoliotia* sp.																X																0.0233
Triphoridae	*Metaxia* sp.					X	X							X	X		X						X		X		X	X					0.1790
Triphoridae	*Subulphora* sp.			X	X			X	X	X	X	X	X	X		X	X	X			X	X	X	X		X	X						1.0017
Trochidae	*Herpetopoma atrata*			X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X						7.3648
Trochidae	*Thalotia* sp.		X		X		X	X			X	X				X							X	X	X	X	X	X					7.0767
TERRESTRIAL GASTROPODA																																	
Camaenidae	Figuladra sp.		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			116.0877
Camaenidae	*Trachiopsis mucosa*			X	X				X																								9.4184
Pupillidae	*Pupoides pacificus*		X	X	X	X	X	X	X	X	X	X										X	X	X	X	X	X	X				X	0.6877
Subulinidae	*Eremopeas tuckeri*		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		4.2172
FRESHWATER BIVALVIA																																	
Corbiculidae	*Corbicula australis*																						X	X	X	X							2.4568

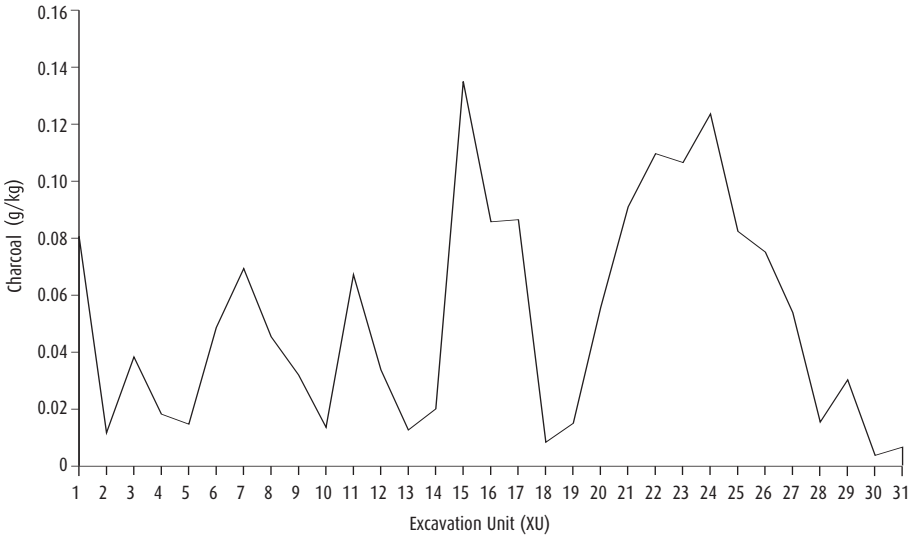

Figure 6.13 Abundance of charcoal.

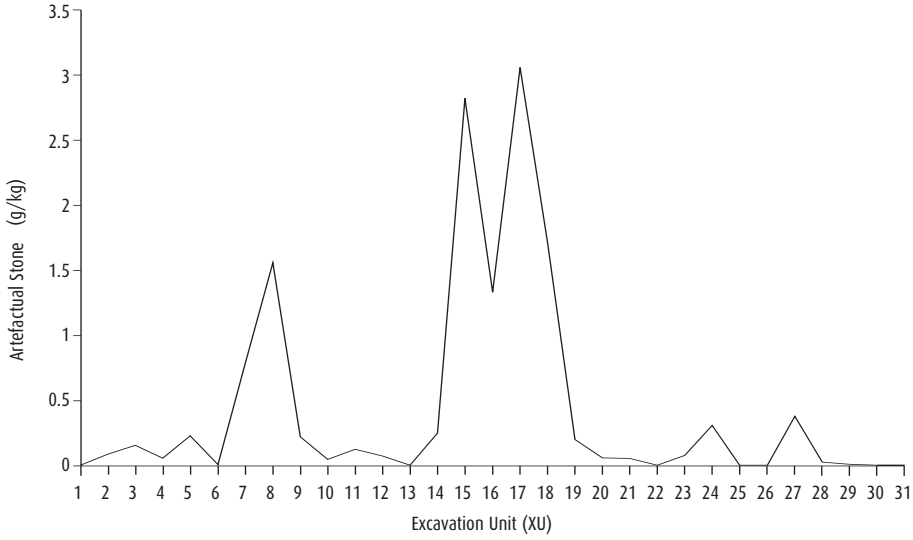

Figure 6.14 Abundance of artefactual stone.

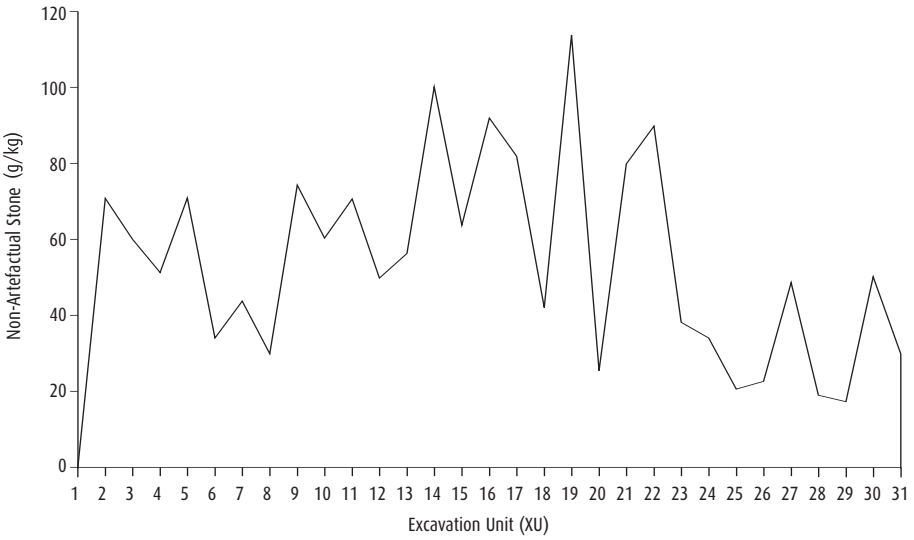

Figure 6.15 Abundance of non-artefactual stone.

Table 6.4 Metrical data for intact and broken (with umbo) *A. trapezia* valves from the Seven Mile Creek Mound, Square A.

	MEAN LENGTH			MEAN HEIGHT			MEAN WIDTH			MEAN WEIGHT			MEAN HINGE		
XU	n	mm	±	n	mm	±	n	mm	±	n	g	±	n	mm	±
2	38	40.6	4.5	47	35.6	4.1	61	14.8	1.9	37	13.0	4.5	52	26.0	2.9
3	66	39.9	5.5	86	27.3	10.5	90	14.6	2.1	61	11.6	4.28	79	25.1	3.4
4	41	38.9	5.0	44	33.4	4.6	48	14.1	2.1	39	10.5	4.4	44	24.3	3.3
5	12	37.7	3.3	13	33.2	3.9	14	15.8	4.0	12	10.4	3.4	14	23.9	2.8
6	18	41.4	3.6	19	35.0	3.6	19	15.4	1.8	18	12.8	4.0	17	25.5	2.7
7	8	40.2	5.6	9	35.4	4.5	10	15.9	1.7	8	13.2	4.7	8	25.1	2.7
8	24	42.2	4.3	24	35.5	2.8	25	15.7	1.7	24	13.9	3.1	22	26.0	2.6
9	31	40.2	4.6	31	34.0	3.7	32	15.0	1.2	31	12.1	3.3	31	24.5	3.0
10	39	39.9	3.3	40	34.5	2.9	40	14.8	1.2	39	11.8	2.6	39	24.3	2.2
11	4	34.8	10.7	4	29.5	9.6	4	12.7	4.4	4	9.0	5.5	4	22.0	5.4
12	7	31.7	12.8	7	25.6	11.1	7	11.3	5.2	6	7.4	6.2	6	20.2	8.3
13	39	42.8	3.4	39	36.9	3.3	39	15.3	1.7	38	13	3.6	36	25.8	2.6
14	8	44.5	5.2	8	37.7	4.4	8	16.7	2.1	8	14.7	4.9	8	25.9	4.0
15	7	37.9	10.0	7	32.0	8.6	7	14.9	4.2	7	11.6	6.6	7	23.9	5.4
16	6	38.1	6.8	6	31.6	6.2	6	13.2	2.4	6	9.7	3.9	6	23.9	4.0
17	5	42.2	2.3	5	37.7	1.5	5	15.1	0.9	5	13.4	2.4	5	26.6	2.1
18	11	43.3	7.8	11	38.0	6.8	11	15.6	3.0	11	14.5	6.9	11	26.8	5.0
19	46	45.5	3.9	50	39.9	3.8	50	16.5	1.9	44	16.7	5.3	45	27.5	2.7
20	130	44.9	4.3	130	39.2	4.1	131	16.3	1.9	123	15.7	4.5	122	27.2	2.8
21	75	44.9	5.6	76	40.0	4.8	78	16.4	2.2	66	16.5	4.8	69	28.1	3.3
22	21	36.4	4.9	24	31.4	4.0	24	13.3	1.8	21	8.2	2.9	22	22.8	2.6
23	21	39.0	8.6	21	33.6	7.4	22	14.3	3.0	19	12.4	6.1	21	24.9	4.1
24	21	43.7	6.2	22	37.7	6.3	22	15.7	2.7	19	14.5	6.7	21	26.3	3.6
25	5	44.6	8.7	5	38.3	8.4	5	15.9	3.0	5	17.1	9.3	5	27.5	4.8
26	6	44.4	5.3	7	37.6	4.0	8	15.4	2.5	6	14.5	4.5	4	27.9	4.3
Total	689	41.4	0.9	735	36.1	0.8	766	15.2	0.4	657	12.4	0.8	698	25.5	0.6

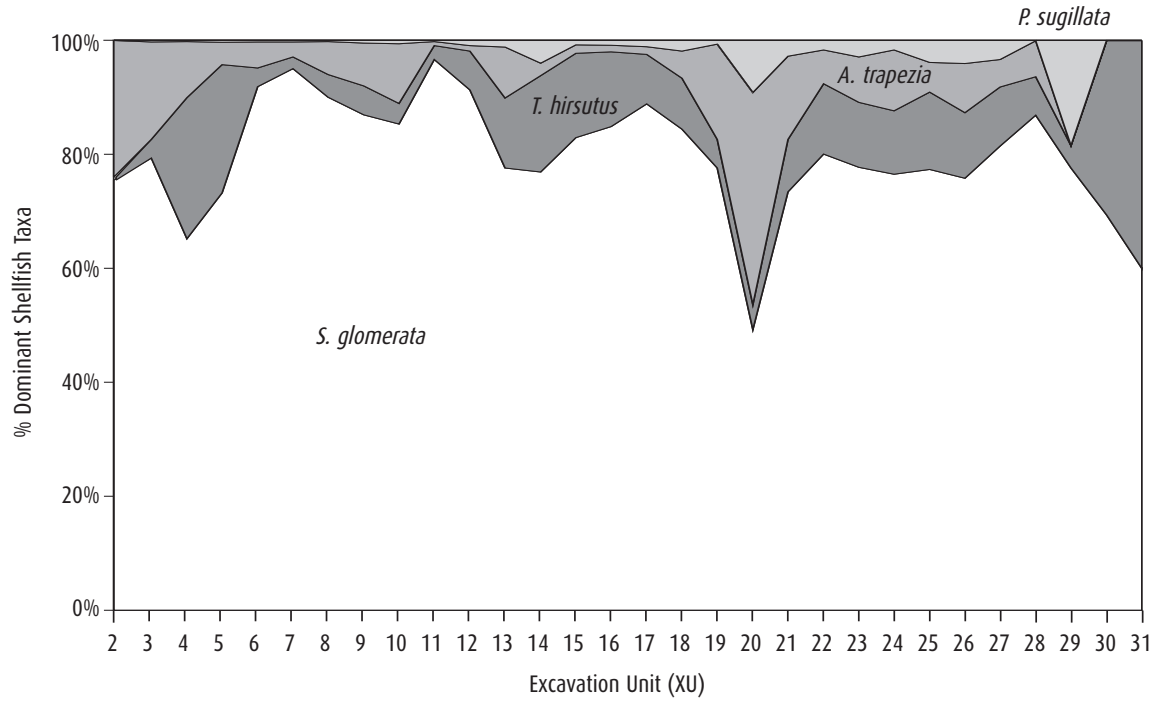

Figure 6.16 Relative contribution of dominant shellfish taxa. Note that XU1 is excluded as it contained negligible quantities of shell (see Appendix 4).

The relative homogeneity in the diversity and abundance of the dominant taxa throughout the deposit suggests no major changes in foraging targetting strategies or resource availability in the area during the period of site use. The entire suite of shellfish taxa recovered is consistent with shallow estuarine conditions and the presence of intertidal and subtidal flats containing a range of rock/shell debris beds, seagrass and mudflats. The only apparently anomalous taxon identified is the freshwater bivalve *Corbicula (Corbiculina) australis*, which populates coastal rivers and streams, although incidental gathering of this taxon from shell debris beds seems a reasonable assumption. The four species of terrestrial gastropods also indicate the broad similarity of the current vegetation structure to that obtaining during the period of site occupation.

Very intensive localised shellfishing has the potential to skew the demographic structure of mollusc assemblages in intertidal communities and reduce the availability of large specimens (Swadling 1976). This was investigated using *A. trapezia* as an indicator taxa. There is no significant change in the mean size of *A. trapezia* throughout the deposit as measured by five attributes (length, height, width, weight and hinge length) (Table 6.4). The mean length of *A. trapezia* does not fall below 31.7mm in any excavation unit, with a combined weighted mean length calculated on 689 valves of 41.4±0.9 (χ^2=7.2197, df=24, p≤0.05) and a terminal mean of 40.6±4.5mm for XU2 (XU1 was the shallow surface covering of turf). Inglis (1992) found that *A. trapezia* attains a length of 20–30mm within 12 months with large individuals (>40mm) growing less than c.1mm/year up to 70–80mm. The majority of individuals in this assemblage are, therefore, over 12 months of age and probably several years of age, discounting the hypothesis that site abandonment is related to overpredation of *A. trapezia*.

Vertebrate remains

Fish bone is present throughout the cultural deposit, totalling 34.4g consisting of 1,346 pieces of bone and a NISP of 54 (Fig. 6.12). A total MNI of 37 was calculated by totalling the MNI for each excavation unit. The weight of bone identified to taxon was 1.6g, giving an identification rate of 4.75% (Table 6.5). Identified taxa in descending order of abundance include flathead (Platycephalidae), whiting (Sillaginidae), Sparidae (including bream, *Acanthopagrus australis*) and mullet (Mugilidae) (Table 6.6). Size-classing of vertebrae showed that 69% have a centrum diameter of 3mm or less. These represent very small fin fish. Some larger fish are represented by vertebrae from XU9–15 (see Vale 2002 for further details). Twenty-five pieces of bone weighing 4g could not be assigned to a fish skeletal element. The small size of these specimens and the lack of diagnostic attributes prevented identification to taxon.

Of the six vertebral samples subject to DNA analysis, only one returned a positive fish-like polymerase chain reaction (PCR) product, although this extract did not produce a product when sequenced (Hlinka et al. 2002). Taphonomic factors are thought to be responsible for the low amplification success rate (see Hlinka et al. 2002 for further details).

Stone artefacts

Stone artefacts are distributed throughout the cultural deposit between XU2–29 (Fig. 6.14). A total of 207 stone artefacts weighing 169.1g was identified in Square A (Table 6.7). Seven stone artefacts were plotted *in situ* during excavation, with the remainder recovered from the sieve residue. Virtually the entire assemblage is manufactured on quartz (n=199) with occasional granodiorite (n=4), greywacke (n=2), chert (n=1) and silcrete (n=1). Four flakes were identified, with the remainder consisting of flaked pieces. All raw materials are available in the immediate vicinity of the site, with a range of rock types available on estuarine gravel beds adjacent to the site. Most artefacts are extremely small, with an average maximum dimension of 13.1mm and average weight of 0.8g.

Other remains

A range of other materials was recovered from the site. Small nodules of red ochre totalling 1.5g were recovered from XU12–15. Small pieces of pumice totalling 32.2g were recovered from the bottom half of the deposit (XU13, 20–31). Charcoal is represented in very small quantities throughout the deposit, totalling 18.8g (Fig. 6.13). The presence of charcoal in culturally-sterile sediments below the shell deposit suggests the possibility that some of the other charcoal represented in the assemblage may be natural.

Table 6.5 Fish bone abundance, Seven Mile Creek Mound, Square A.

XU	NUMBER SPECIMENS	TOTAL WEIGHT (g)	NISP	WEIGHT NISP (g)	MNI	% IDENTIFIED BY WEIGHT
1	0	0	0	0	0	0
2	14	0.5106	0	0	0	0
3	47	1.2786	3	0.0495	2	9.70
4	74	1.1613	1	0.0115	1	0.90
5	53	0.9165	2	0.0217	1	0.02
6	98	1.3380	5	0.0760	3	5.68
7	60	1.4591	5	0.5054	4	34.64
8	16	0.2120	0	0	0	0
9	27	0.6474	2	0.0314	2	4.85
10	18	0.2565	0	0	0	0
11	169	4.8736	6	0.1938	3	3.98
12	115	2.2661	3	0.0755	2	3.33
13	61	3.5652	8	0.1072	6	3.01
14	176	4.7367	10	0.1443	5	3.05
15	132	3.9176	6	0.2088	5	5.33
16	52	2.0026	0	0	0	0
17	47	0.7844	0	0	0	0
18	8	0.1657	0	0	0	0
19	22	0.2808	0	0	0	0
20	12	0.4353	0	0	0	0
21	69	0.8567	0	0	0	0
22	16	0.3883	2	0.0591	2	15.22
23	17	0.3532	0	0	0	0
24	14	0.1496	1	0.1496	1	100.00
25	7	0.1879	0	0	0	0
26	18	1.5749	0	0	0	0
27	2	0.0260	0	0	0	0
28	1	0.0113	0	0	0	0
29	1	0.0299	0	0	0	0
30	0	0	0	0	0	0
31	0	0	0	0	0	0
Total	1346	34.3858	54	1.6338	37	4.75

Table 6.6 Fish bone taxonomic representation, Seven Mile Creek Mound, Square A.

TAXON	NISP	MNI	WEIGHT (g)	XUs
Platycephalidae	21	15	0.94	6–7, 9, 11–15, 22, 24
Sillaginidae	16	11	0.25	3, 5–7, 9, 11, 13–15, 22
Sparidae	13	6	0.22	3–4, 6–7, 12–14
Mugilidae	4	3	0.06	11, 13, 15

Table 6.7 Stone artefacts from the Seven Mile Creek Mound, Square A.

RAW MATERIAL	ARTEFACT TYPE	NUMBER	WEIGHT (g)	XUs
Quartz	Flake	2	10.2785	7, 8
Quartz	Flaked Piece	197	125.6980	2–12, 14–21, 23, 27–28
Granodiorite	Flake	2	8.3893	24, 27
Granodiorite	Flaked Piece	2	23.8782	17, 23
Greywacke	Flaked Piece	2	0.1824	4, 20
Chert	Flaked Piece	1	0.6016	4
Silcrete	Flaked Piece	1	0.0789	29
Total	–	207	169.1069	–

Discussion

The Seven Mile Creek Mound was deposited over a period of some 350 years between c.3,950–3600 cal BP. Deposits represent broad utilisation of intertidal and near-shore resources, including extensive shellfishing, crabbing and fin fishing. Shell remains are dominated by oyster, with varying quantities of hairy mussel, mud ark and scallop. Although fish remains occur throughout the deposit, they are infrequent and represent very small fish.

There are no clear stratigraphic features within the main shell unit (SUII) of Square A, with the exception of SUIIa. However, the internally consistent radiocarbon chronology and analysis of the shell and sediment fractions suggest that rapid deposition at the site occurred in a sequence of events rather than by continuous occupation. The distribution of overlapping *A. trapezia* conjoin sets indicates that the site can be divided into at least two major sequential accumulation events (XU2–12, XU18–24), separated by zones that are also possibly associated with these events (Fig. 6.7).

The Seven Mile Creek Mound does not appear to have been used as a camp site, but rather functioned as a refuse pile similar to that documented for the Bayley Point 3 shell mound in the Gulf of Carpentaria (Robins et al. 1998). The absence of significant oxidation and fragmentation of *A. trapezia* suggests no significant exposure to heating either before or after discard (Robins and Stock 1990). Further, no hearths or ashy sediments were observed in the deposit and charcoal is virtually absent. These observations provide strong support for a model of offsite preparation and consumption of shellfish (and other food) with secondary discard on the mound (Meehan 1982:86; Robins et al. 1998:120). The creation of the mound is therefore likely to result from intentional discard rules operating at the site.

Hiscock (2001:141) has suggested that mound-building in northern Australia is related to patterns of reduced residential mobility. This does not appear to be the case at the Seven Mile Creek Mound. The site differs in a number of respects from shell mounds reported across northern Australia (e.g. Bailey 1994; Beaton 1985). The site is an isolate (as are the other two shell mounds known in the region) and not part of a group of mounds or even located adjacent to other sites. Oyster dominates a shellfish assemblage comprising a broad range of intertidal taxa, whereas northern Australian mounds are mono-specific accumulations of *A. granosa* (e.g. Robins et al. 1998). The mound is not coeval with any other dated deposits in the area, pre-dating the next oldest site (the Mort Creek Site Complex) by some 300 years. A single date from a disturbed section of the Round Hill Creek Mound of 1,910±42 BP (Wk-10090) suggests that mound formation in the region may have occurred independently through time and space. The episodic nature of site occupation and the absence of coeval coastal assemblages raises the possibility that occupation of the Seven Mile Creek Mound was part of an inland-based settlement-subsistence system rather than one based on permanent occupation of the coast (this idea is explored further in Chapter 14).

The cessation of mound-building and abandonment of the Seven Mile Creek Mound can be ascribed to a combination of possible factors: (1) changes in resource availability, caused by either environmental change or overexploitation; (2) changes in subsistence strategies and/or settlement

behaviour, related to either environmental and/or cultural factors; (3) changes in discard rules away from mounding behaviour to less visible forms of deposit with lower survival potential; and/or (4) changes in land-use through alterations to regional settlement strategies. These arguments have been advanced previously in north and northwest Australia to explain the abandonment of shell mound sites dominated by *A. granosa* around 1,000 BP. Hiscock (1997) and O'Connor (1999), for example, have both linked mound abandonment to habitat change caused by mangrove invasion. At the Seven Mile Creek Mound, with the possible exception of catastrophic storm-based environmental change, the diversity of estuarine taxa represented in the mound and the lack of change in shellfish size throughout the sequence suggest the presence of a stable estuary that was not suffering from overexploitation. Although discard rules may have changed, an extensive survey and dating program has failed to find coeval sites indicating a change in site form. These data therefore lend some support to the idea that site abandonment was linked to changes in regional settlement strategies that were not principally reliant on coastal resources.

The age and contents of the site also have implications for understanding regional palaeoenvironments. The basal age of the site is congruent with recent models of sea-level change on the Queensland coast suggesting a Holocene stillstand of +1.65m at c.5,500 BP until c.3,700 BP, when sea-levels dropped to approximately modern values (Larcombe et al. 1995). The low elevation landform that the Seven Mile Creek Mound is situated on was probably overtopped by the mid-Holocene sea-level highstand, dating highstand on the southern Curtis Coast to before 4,000 BP. Site contents indicate that productive estuaries were in place by this time, with a broad range of commensal species representing shallow intertidal and subtidal rock/shell debris, mudflats and seagrass beds. Results from the Seven Mile Creek Mound therefore support the findings of other recent research suggesting that Aboriginal groups were resident in some regions of the Queensland coast at the time of local sea-level stabilisation (e.g. Barker 1996; McNiven 1991a), contrary to models of mid-Holocene coastal abandonment proposed by Beaton (1985).

Broader implications

Coastal archaeological sites older than 3,000 BP are not common on the Queensland coast (see Ulm et al. 1995; Ulm and Reid 2000, 2004 for a review). Although several rockshelters containing evidence for marine resource exploitation in the Whitsunday Islands (Barker 1996) and Princess Charlotte Bay areas (Beaton 1985) date to around or before the mid-Holocene, only two open sites on the Queensland coast have evidence of focussed marine resource exploitation pre-dating 3,000 BP. The Hope Island site on the Coomera River, dated on charcoal to 4,350±220 BP (Beta-20799), contains abundant shell remains, although fish bone is apparently absent (Walters et al. 1987). Mazie Bay on North Keppel Island is dated on charcoal to 4,274±94 BP (NZA-456) but quantities of shell and fish bone are only present in deposits dated to shortly before 3,000 BP (Rowland 1999).

In all other open coastal sites in Queensland pre-dating 3,000 BP (n=7) faunal remains are either entirely absent, represented in minute quantities or restricted to deposits dated to the last 3,000 years. This is the case at Wallen Wallen Creek (Neal and Stock 1986), New Brisbane Airport (Hall and Lilley 1987), Teewah Beach Site 26 (McNiven 1991), King's Bore Sandblow Site 97 (McNiven 1992a), Eurimbula Site 1 (Ulm et al. 1999a), Mort Creek Site Complex (see Chapter 7) and Townsville Common (Kelly 1982), although the cultural status of this last site is equivocal. The absence of faunal remains from these early deposits is commonly attributed to ephemeral occupation, taphonomic considerations and/or recovery strategies (Ulm 2002a). The presence of fish bone, crab shell and a variety of shellfish remains throughout the sequence enables data from the Seven Mile Creek Mound to contribute uniquely to understandings of Aboriginal use of late Holocene coasts during the period 3.5–4ka.

Walters (1986, 1989, 1992a, 1992b) has consistently argued that marine fishing was only incorporated as a regular feature of subsistence-settlement systems in southeast Queensland after

2,000 BP. Data from the Seven Mile Creek Mound provide the first unequivocal evidence for significant fish bone discard dating earlier than 3,500 BP. The Seven Mile Creek Mound is the oldest dated shell mound in Queensland, pre-dating the earliest mounds at Weipa (Bailey et al. 1994; Stone 1992) and Princess Charlotte Bay (Beaton 1985; David and Lourandos 1997) by over 1,000 years and pre-dating the Booral Shell Mound (Frankland 1990) by over 700 years.

Summary

The Seven Mile Creek Mound was briefly and intensively occupied by Aboriginal hunter-gatherers for a period of approximately 350 years between 3,950–3,600 years ago. Mound construction appears to have occurred episodically and involved secondary disposal of food refuse collected from adjacent intertidal flats and prepared and consumed offsite. The mound is unique in the region and exhibits more similarity in form, content and chronology to the occasional mounds recorded further to the south than the very large mono-specific mounds which feature in the archaeological record above the Tropic of Capricorn. The short duration and focussed nature of cultural discard at the site provides critical chronological resolution of Indigenous occupation compared with the long-term, spatially-diffuse Aboriginal occupation sites which dominate the archaeology of the region. The data enable a significant and detailed understanding of the late Holocene social, cultural and natural environment of the southern Curtis Coast which may now be explored.